

ABSTRACT OF THE DISCLOSURE

METHOD FOR REDUCING BIAS ERROR IN A VIBRATING STRUCTURE
GYROSCOPE

A method for reducing bias error in a Vibrating Structure Gyroscope having a vibrating structure, a [(1,)] primary drive ~~means~~ (2), for putting the vibrating structure [(1)] into carrier mode resonance, a primary pick-off ~~means~~ (3) device for sensing carrier mode motion, a secondary pick-off ~~means~~ (10) for sensing response mode vibration of the vibrating structure [(1)] in response to applied rotation rate, a secondary drive ~~means~~ (16) for applying a force to control the response mode motion, closed loop primary control loops for maintaining a fixed amplitude of motion at the primary pick-off device, ~~means~~ (3) for maintaining the drive frequency at the resonance maximum, and secondary control loops for maintaining a null at the secondary pick-off device, ~~means~~ (10). In the method the ratio SF_{QUAD} over SF_{IN-PHASE} is measured from the secondary control loop to provide a direct measurement of Sin (φ_{SD} + φ_{PPO}), according to the relationship SF_{QUAD} = SF_{IN-PHASE} x Sin (φ_{SD} + φ_{PPO}) where SF_{QUAD} is the quadrature scalefactor SF_{IN-PHASE} is the in-phase scalefactor, φ_{SD} is the phase error in the secondary drive [[means]] and φ_{PPO} is the phase error in the primary pick-off ~~means~~ device. The total phase error φ_E is obtained directly from the measured Sin (φ_{SD} + φ_{PPO}) according to the relationship; φ_E = φ_{SD} + φ_{PPO} and phase corrections applied to the secondary drive ~~means~~ (16) and/or primary pick-off ~~means~~ (3) device to reduce the phase error φ_E, and hence the quadrature bias error, to enhance the performance of the gyroscope.